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Phase Diagrams for Ceramists

Volume VI

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The Phase Diagrams published in this volume were collected and reviewed by the Phase Diagrams for Ceramists Data Center, located in the National Measurement Laboratory of the National Bureau of Standards. We are pleased that this cooperative effort between the American Ceramic Society and the National Bureau of Standards continues to provide important reference information to the ceramics community.

David R. Lide, Jr., Chief
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Dy_2O_3-ZrO_2 (concl.)

(C)

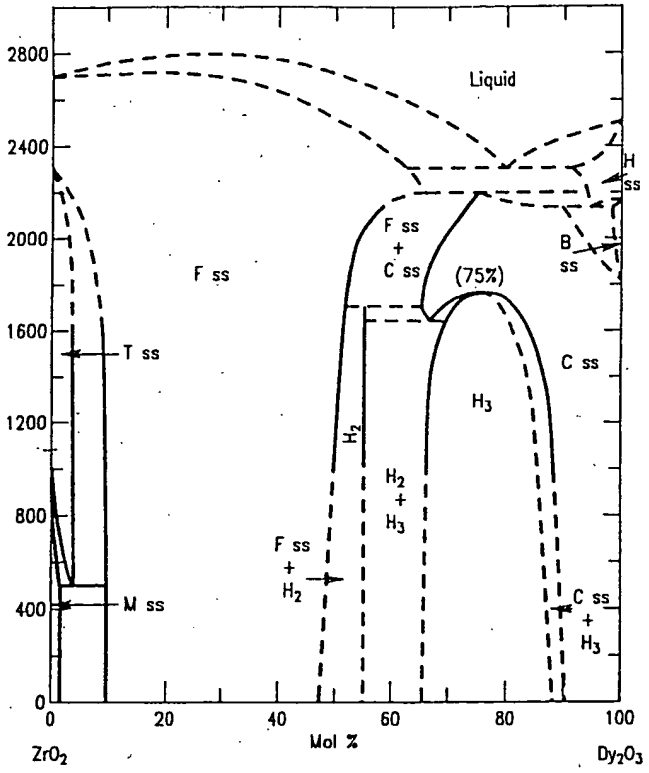

Fig. 6464—System Dy_2O_3-ZrO_2. (*A*) Zirconia-rich region of the tentative zirconia-dysprosia system; (*B*) effect of dysprosia on tetragonal-monoclinic transformation temperature of zirconia on cooling; (*C*) phase diagram for zirconia-dysprosia system. M, Mon = monoclinic; F = cubic fluorite-type; T, Tet = tetragonal; C = cubic rare earth oxide-type; H_2 = $M_7O_{11.5}$-type; H_3 = M_7O_{11}-type; H = hexagonal high temperature rare earth oxide-type; B = monoclinic rare earth oxide-type.

C. Pascual and P. Duran, *J. Mater. Sci.*, 15 [7] 1701-1708 (1980).

Zirconia (99.8%) and dysprosia (99.9%) were mixed by grinding, pressed, and sintered at 1300°C. They were then refired at 1800°C or melted in a solar furnace, reground, pressed into pellets, and heated to 1765°C in air, using wire wound furnaces in air or gas firing. A few firings above 2000°C were in flowing Ar-5% H_2. Compositions were investigated at 5% intervals and were contained in Pt foil below 1250°C.

Temperatures were controlled by thermocouples to 1750°C, and by optical pyrometer at higher temperatures. Quenched specimens were analyzed by X-ray diffraction. High temperature X-ray diffraction, to 1500°C in air, was used to analyze specimens containing 0 to 10% Dy_2O_3.

The diagrams are in essential agreement with the closely related ZrO_2-rare earth systems. See Figs. 2363 and 5211 for somewhat differing results. The depression of the ZrO_2 transformation is as expected.

D.R.W.

Dy_2O_3-V_2O_5

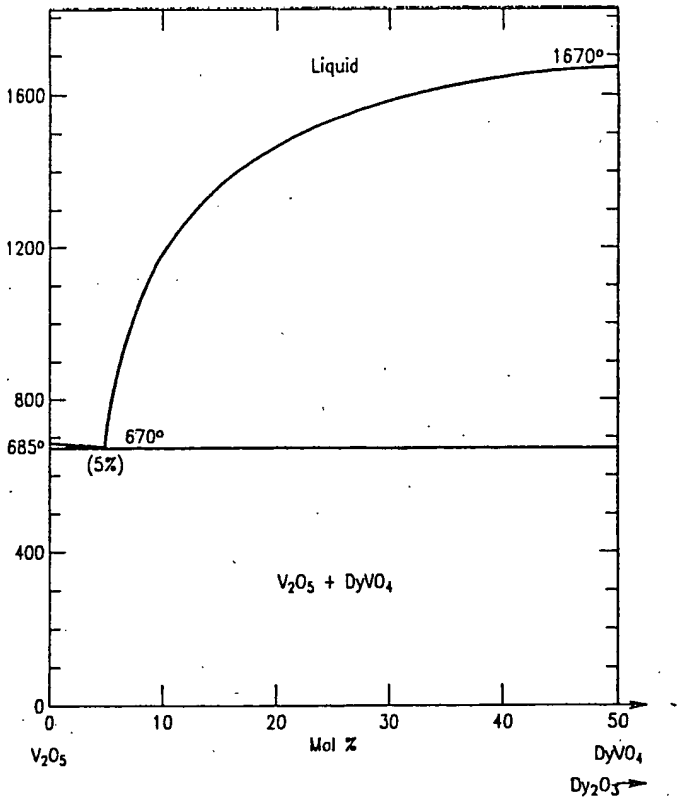

Fig. 6465—System V_2O_5-$DyVO_4$.

G. A. Rykova, O. N. Ustalova, V. M. Skorikov, and I. V. Tananaev, *Zh. Neorg. Khim.*, 24 [1] 183-187 (1979); *Russ. J. Inorg. Chem. (Engl. Transl.)*, 24 [1] 102-105 (1979).

Experimental details are the same as those described in the commentary accompanying Fig. 6476. The orthovanadate compound, $DyVO_4$, was found to melt congruently. The presence of V(IV) in these compounds could not be detected by magnetic susceptibility measurements. The enthalpy of formation (670°C) of the orthovanadate was determined to ±3% from DTA traces, using $CaCO_3$ as a calibration standard.

$DyVO_4$ is tetragonal and of the $ZrSiO_4$ type. See Fig. 2364 for the polymorphism of $DyVO_4$ under pressure.

M.F.B.

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